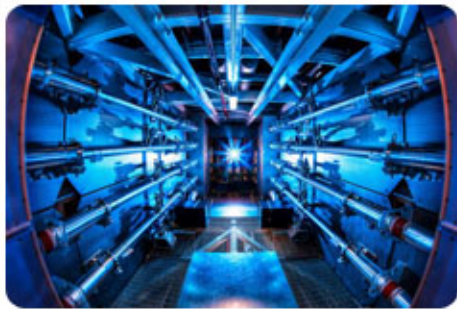


## LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Dec. 3-7, 2012



A PHOTO WORTH 192 LASERS



**Preamplifiers line a corridor at the Laboratory's National Ignition Facility .**

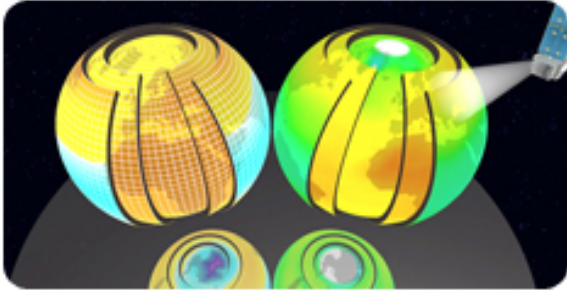
*National Geographic* recently featured a pictorial of the world's most powerful laser -- The National Ignition Facility at Lawrence Livermore.

From preamplifiers, which work by increasing the energy of laser beams, to a view inside the target chamber, the magazine takes a look at the quantum leap that NIF plans to make in the coming years.

The goal is to create fusion -- the same energy that powers the sun -- in a laboratory setting.

To see more, go to [National Geographic](#).

**The Washington Post** A COMPELLING CASE



**A month-by-month sequence of atmospheric temperature changes over the 396-month period from January 1979 to December 2011.**

Lawrence Livermore scientists have further solidified the link between human activity and rising global temperatures.

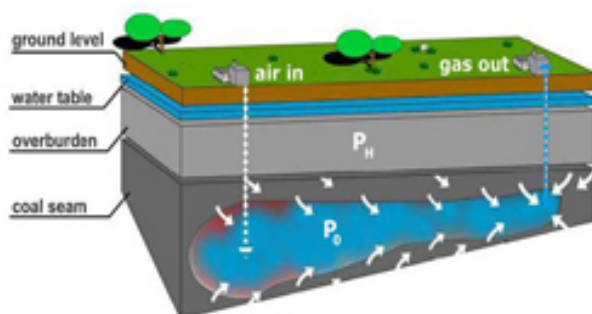
The researchers compared the findings of complex climate models against three decades of direct satellite observations. In response to human-related emissions, the models show a particular pattern of temperature change -- cooling in the upper atmosphere, warming in the lower atmosphere.

That pattern, the scientists found, also is present in the satellite record. Using similar methods, they also found that natural climate variability is extremely unlikely to explain the modeled and observed results.

To read more, go to the [Washington Post](#).



#### UNDERGROUND COAL: IT'S A GAS



**Underground coal gasification (UCG)** is a process that converts coal *in-situ* to syngas using the Earth's crust as a reactor vessel.

Underground coal gasification (UCG) is a promising technology for converting coal to an energy-rich gas. It has the cleanliness and carbon capture advantages of surface gasification and avoids many of the safety and environmental hazards of mining.

The Lawrence Livermore recently received a two-year research grant to study water-quality hazard mitigation strategies in UCG.

UCG has had a mixed history for groundwater contamination. According to LLNL UCG Program Leader David Camp, some of the past UCG field tests have had problems with contamination, while others have demonstrated clean operation.

"We believe we understand the principles of clean operation. The information we develop under this \$200,000 grant will help regulators do their job of assuring minimal environmental impacts."

To read more, go to [R&D Magazine](#).



A LONG AND KEANE ACCOMPLISHMENT



### Jane Long and Christopher Keane

Lawrence Livermore's Jane Long and Christopher Keane have been awarded the distinction of fellow of the American Association for the Advancement of Science (AAAS).

Election as a fellow is an honor bestowed upon AAAS members by their peers to recognize distinguished efforts to advance science or its applications. This year, AAAS awarded 702 members with this honor.

Long, who recently retired from LLNL, is recognized by AAAS for "distinguished contributions to

assessing the societal implications of technology development, including in areas of climate change, geoengineering, nuclear waste and energy technology."

Keane is recognized for "distinguished technical and scientific leadership in developing inertial confinement fusion and high energy density science, and leading a robust global science community in this area."

To read more, go to [phys.org](http://phys.org).



### **Sequoia supercomputer**

Two teams of Department of Energy (DOE) scientists have broken new ground by exceeding, for the first time, a sustained performance level of 10 petaflops (quadrillion floating point operations per second) on the Sequoia supercomputer at the Laboratory.

A team led by Argonne National Laboratory used the recently developed Hardware/Hybrid Accelerated Cosmology Codes (HACC) framework to achieve nearly 14 petaflops on the 20-petaflop Sequoia, an IBM BlueGene/Q supercomputer, in a record-setting benchmark run with 3.6 trillion simulation particles. HACC provides cosmologists the ability to simulate entire survey-sized volumes of the universe at a high resolution, with the ability to track billions of individual galaxies.

Simulations of this kind are required by the next generation of cosmological surveys to help elucidate the nature of dark energy and dark matter. The HACC framework is designed for extreme performance in the weak scaling limit (high levels of memory use) by integrating innovative algorithms, as well as programming paradigms, in a way that easily adapts to different computer architectures.

To read more, go to [HPC Wire](http://HPCWire).

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report*, send [e-mail](#).